RESEARCH

A systematic review of systematic reviews of spinal manipulation

E Ernst P H Canter

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SUMMARY

Objectives: To systematically collate and evaluate the evidence from recent systematic reviews of clinical trials of spinal manipulation.

Design: Literature searches were carried out in four electronic databases for all systematic reviews of the effectiveness of spinal manipulation in any indication, published between 2000 and May 2005. Reviews were defined as systematic if they included an explicit and repeatable inclusion and exclusion criteria for studies.

Results: Sixteen papers were included relating to the following conditions: back pain (*n*=3), neck pain (*n*=2), lower back pain and neck pain (*n*=1), headache (*n*=3), non-spinal pain (*n*=1), primary and secondary dysmenorrhoea (*n*=1), infantile colic (*n*=1), asthma (*n*=1), allergy (*n*=1), cervicogenic dizziness (*n*=1), and any medical problem (*n*=1). The conclusions of these reviews were largely negative, except for back pain where spinal manipulation was considered superior to sham manipulation but not better than conventional treatments.

Conclusions: Collectively these data do not demonstrate that spinal manipulation is an effective intervention for any condition. Given the possibility of adverse effects, this review does not suggest that spinal manipulation is a recommendable treatment.

INTRODUCTION

Spinal manipulation (SM) is a traditional form of treatment practised by chiropractors, osteopaths, physiotherapists and other healthcare providers mostly (but not exclusively) to treat musculoskeletal problems. A precise definition of SM is still under debate[1] but most experts would probably agree that SM can be described as 'the use of hands applied to the patient incorporating the use of instructions and manoeuvres to achieve maximal painless movement and exposure of the musculoskeletal system'[2] or as 'the application of a load (force) to specific body tissues with therapeutic intent'.[3] The postulated modes of action of SM include: increase of joint movement, changes in joint kinematics, increase of pain threshold, increase of muscle strength, attenuation of alpha-motoneuron activity, enhanced proprioceptive behaviour, as well as release of beta-endorphins and substance P[3].

Spinal manipulation is popular. About 70 000 chiropractors are licensed in the US, 10 000 in Japan, 6000 in Canada, 2500 in Australia and 16 000 in the UK.[4] The costs associated with SM are substantial.[5] It is therefore desirable to define the effectiveness of this approach as closely as possible. Numerous systematic reviews of SM are available but they frequently arrive at vastly different conclusions. This article summarizes the evidence from recent systematic reviews and aims at clearing some of the existing confusion about the effectiveness of SM.

METHODS

Electronic literature searches were conducted to identify all systematic reviews of spinal manipulation for any indication. The search [Chiropract* OR spinal manipul* OR manual therap* OR osteopath*] AND [systematic ADJ review] was carried out in the following electronic databases: Medline, Embase, AMED, Cochrane Database. In those databases which allowed it, searches were further limited to articles classified as reviews or meta-analyses and, in all cases, the search was restricted to articles published between 2000 and May 2005. No language restrictions were applied. Abstracts of reviews thus located were inspected by one author (PC) and those appearing to meet the inclusion criteria were retrieved and read in full by both authors. Reviews were defined as systematic if they included an explicit and repeatable method for searching the scientific literature and if there were explicit and repeatable inclusion and exclusion criteria for studies. These criteria are the first two items from a scoring system previously used to assess the methodological quality of reviews of spinal manipulation.[6]

To be included, systematic reviews had to be concerned specifically with the effectiveness of SM and to include evidence from at least two controlled clinical trials. Systematic reviews were considered regardless of the medical condition they referred to. Systematic reviews of complex packages of interventions which happened to include SM were excluded. Reviews which depended upon

Complementary Medicine, Peninsula Medical School, Universities of Exeter & Plymouth, 25 Victoria Park Road, Exeter EX2 4NT, UK

Correspondence to: Professor E Ernst

E-mail: Edzard.Ernst@pms.ac.uk

Table 1 **Systematic reviews of spinal manipulation (SM)**

First author (year)	*Interventions*	*Condition treated*	*n*	*Meta-analysis*	*Overall result **	*Comment*
Ferreira (2002) [Ref. 7]	SM	Chronic low back pain	12	Yes	(SM) . . . is not substantially more effective than sham treatment in reducing pain, nor is it more effective than NSAIDs in improving disability in chronic low back pain patients. It is not clear whether . . . (SM) . . . is more effective than NSAIDs in reducing pain in chronic low back pain patients	
Ernst (2003) [Ref. 8]	Chiropractic SM	Low back pain	12	No	Effectiveness . . . not supported by compelling evidence from the majority of RCTs	Focus exclusively on SM as performed by chiropractors
Assendelft (2004) [Ref. 9]	Any type of SM	Low back pain	39	Yes	No evidence that SM is superior to other standard treatments for acute or chronic low back pain	Also included RCTs of mobilization
Bronfort (2004) [Ref. 10]	SM and mobilization	Low back pain and neck pain	69	No	. . . recommendations can be made with some confidence regarding the use of SM and/or mobilization as a viable option for treatment of both low back pain and neck pain	Conclusions based on 43 RCTs meeting admissibility criteria for evidence
Ernst (2003) [Ref. 11]	Chiropractic SM	Neck pain	4	No	The notion that chiropractic SM is more effective than conventional exercise . . . was not supported by rigorous trial data	Focus exclusively on SM as performed by chiropractors
Gross (2004) [Ref. 12]	Any type of SM and mobilization	Neck problems	33	Yes	. . . evidence did not favour SM/ mobilization done alone	Some evidence emerged to suggest that, combined with exercise, it is beneficial
Bronfort (2001) [Ref. 13]	SM	Chronic headache	9	No	SM appears to have a better effect than massage for cervicogenic headache . . . an effect comparable to commonly used first-line prophylactic prescription medications for tension-type headache and migraine headache. This conclusion rests upon a few trials of adequate methodological quality. Before any firm conclusions can be drawn, further testing should be done . . .	
Astin (2002) [Ref. 14]	Any type of SM	Headache disorders	8	No	The data available to date do not support . . . that SM is an effective treatment for headache	
Lenssinck (2004) [Ref. 15]	Physiotherapy and/or spinal manipulation	Tension type headache	8	No	. . . there is insufficient evidence to either support or refute the effectiveness of physiotherapy and (SM) compared to other treatments	Included five RCTs of SM including two high quality RCTs of chiropractic with contradictory results
Ernst (2003) [Ref. 16]	Chiropractic SM	Non-spinal pain syndromes	8	No	The claim that SM is effective for such conditions is not based on data from rigorous clinical studies	Conditions included fibromyalgia, carpal tunnel syndrome, infantile colic, otitis media, dysmenorrhoea and chronic pelvic pain
Proctor (2001) [Ref. 17]	Any type of SM	Primary and secondary dysmenorrhoea	5	No	There is no evidence that SM is effective	Four of the five RCTs were of high velocity, low amplitude thrusts
Husereau (2003) [Ref. 18]	Any type of SM	Infantile colic	4	No	No convincing evidence	Most trials were of low methodological quality

(continued)

Table 1 (continued)

First author (year)	Interventions	Condition treated	n	Meta-analysis	Overall result*	Comment
Hondras (2002) [Ref. 19]	Manual therapy	Asthma	5	No	Insufficient evidence to support the use of manual therapies	Both trials of chiropractic spinal manipulation were negative
Balon (2004) [Ref. 20]	Chiropractic care	Asthma or allergy	6	No	No evidence to support the use of chiropractic SM	Four of the six trials tested SM; three of these studies were negative
Reid (2005) [Ref. 21]	Manual therapy mainly manipulation and mobilization	Cervicogenic dizziness	9	No	. . . there is limited evidence at present to support the use of manual therapy in treating cervicogenic dizziness	Only one of the trials was randomized
Ernst (2001) [Ref. 22]	SM	Any condition	8	No	The most rigorous of these studies suggest that SM is not associated with clinically-relevant specific therapeutic effects	Included only sham-controlled, double-blind RCTs

*Quote from authors' conclusions

n, number of trials included; RCT, randomized clinical trial; NSAIDs, non-steroidal anit-inflammatory drugs

previous systematic reviews for their primary data were also excluded.

Data were extracted independently by two researchers (PC & EE) using pre-defined criteria (Table 1). Disagreements were resolved by discussion between the authors.

RESULTS

After accounting for duplicate publications, the searches described resulted in the identification of 24 unique articles. Eight reviews were excluded. The reasons for exclusion were: protocol only (n=1), practise guideline (n=1), based on previous systematic reviews (n=2), no explicit inclusion and exclusion criteria (n=3), no conclusion regarding effectiveness (n=1). Sixteen systematic reviews were included (Table 1). There was some overlap in relation to indications and the following conditions were included: back pain, neck pain, headache, any non-spinal pain, primary and secondary dysmenorrhoea, infantile colic, asthma, allergy, cervicogenic dizziness, any condition.[7–22] The reviews tended to include either any type of SM or specifically focused on chiropractic SM. Five systematic reviews included more than 10 primary studies[7–12] and two had opted for a meta-analytical approach.[9,12]

Generally speaking, the conclusions drawn from these systematic reviews were disappointing. The meta-analysis by Assendelft *et al*.[9] suggested that SM was superior to sham therapy or to ineffective/harmful interventions for low back pain. The meta-analysis by Gross *et al*.[12] implied that combining SM with other treatments, particularly exercise, is effective in reducing neck pain but demonstrated that SM is not effective as a singular treatment. Bronfort[10] concluded that SM and/or mobilization are viable options for treating low back and neck pain. Bronfort[13] concluded that SM has a better effect than massage and a comparable effect to prophylactic drugs for headache. Reid[21] found only limited evidence from methodologically poor trials for effectiveness in cervicogenic dizziness. All other conclusions agreed that the effectiveness of SM is not supported by the results from rigorous clinical trials.

DISCUSSION

Overall, there is little evidence in recent systematic reviews that SM is effective in any medical condition. We found 4 systematic reviews of SM for low back pain[7–10] of which only one[10] recommended its use. The remaining three systematic reviews,[7–9] concluded that there was little evidence to support such advice. Ferreira[7] concluded that SM is not substantially more effective than sham treatment for pain and no better than NSAIDs in improving disability in chronic back pain. The most recent, most comprehensive and most authoritative review[9] states that SM or mobilization is superior to sham treatment and to detrimental or ineffective treatments but not better than other interventions for back pain.

Three systematic reviews were related to SM for neck pain[10–12] of which one reached a a positive[10] overall conclusion and this was the same review which reached a positive conclusion regarding back pain. The most authoritative of the three reviews[12] stated that SM/mobilization is effective only when combined with other interventions such as exercise and as a sole treatment for neck pain, it is not of demonstrable effectiveness.

Similarly, there are three systematic reviews of SM for headache.[13–15] While Bronfort *et al*.[13] concluded that SM is as effective as other interventions, the other two teams of reviewers[14,15] did not find conclusive evidence in favour of SM.

The evidence from the other systematic reviews of SM for non-spinal pain,[16] dysmenorrhoea,[17] infantile colic,[18] asthma,[19,20] cervicogenic dizziness and any condition[21] is uniformly negative.

Overall, the demonstrable benefit of SM seems to be minimal in the case of acute or chronic back pain; controversial in the case of headache; or absent for all other indications. Other interventions, e.g. exercise therapy, may therefore be preferable.[23–25] We do, however, note that the absence of evidence is not the same as evidence of absence of an effect. None of the reviews conclusively demonstrates that SM is ineffective.

All systematic reviews are prone to publication bias within the primary research data which they include and because our study is a systematic review of systematic reviews, any such bias may have been inherited in our study. In our view, such effects would have tended to favour SM. Our own search strategy was thorough, and although we cannot be absolutely sure that all relevant systematic reviews were located, we believe that publication bias is likely to have been less of a problem in identifying systematic reviews than in identifying all relevant clinical trials. Our previous work[6] has shown that the conclusions of reviews of SM for back pain appear to be influenced by authorship and methodological quality such that authorship by osteopaths or chiropractors and low methodological quality are associated with a positive conclusion. It is perhaps relevant to note that all three of the overtly positive recommendations for SM in the indications back pain,[10] neck pain[10] and headache[13] originate from the same chiropractor. Ernst and/or Canter, the present authors, conducted three of the systematic reviews included[8,11,16] and all three reviews reached negative conclusions about the effectiveness of spinal manipulation. However, these systematic reviews were themselves carried out in a rigorous and systematic fashion and we therefore do not believe that their inclusion represents a source of any additional bias.

We do not have other systematic reviews of systematic reviews of spinal manipulation with which to compare our conclusions, but they are consistent with the conclusions of 13 of the 16 most recent systematic reviews.

Spinal manipulation has been associated with frequent, mild adverse effects[26] and with serious (probably) rare complications.[27] Therefore the risk–benefit balance does not favour SM over other treatment options such as physiotherapeutic exercise. This statement is not in agreement with several national guidelines, for instance, for the treatment of back pain.[28–30] We suggest that these guidelines be reconsidered in the light of the best available data.

In conclusion, we have found no convincing evidence from systematic reviews to suggest that SM is a recommendable treatment option for any medical condition. In several areas, where there is a paucity of primary data, more rigorous clinical trials could advance our knowledge.

Competing interests None.

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